

REMARKS

Status of the claims

Claims 1-12 and 18-25 were pending in the present application. By virtue of this response, claim 22 has been canceled, claims 1, 3, 8, 9, 11, 12, 23, 24, and 25 have been amended, and new claims 26-31 have been added. Accordingly, claims 1-12, 18-21, and 23-31 are currently under consideration.

Support for the claim amendments and new claims may be found in the specification as filed. Support for the amendment to claim 3 is provided, for example, on page 34, lines 6-11 and 25-31, and page 35, lines 1-2. Support for the amendment to claim 8 is provided, for example, on page 24, line 14. Support for the amendment to claim 9 is provided, for example, on page 28, line 3. Support for the amendment to claim 11 is provided, for example, on page 29, line 20. Support for the amendment to claim 12 is provided, for example, on page 29, line 21. Support for the amendments to claims 23-25 is provided, for example, on page 33, lines 5-7. Support for new claim 26 is provided, for example, on page 12, lines 9-11. Support for new claims 27-29 is provided, for example, on page 25, lines 9-21. Support for new claims 30-31 is provided, for example, on page 13, lines 4-10, and in Examples 4 and 5. Claim 1 has been amended to correct clerical errors.

With respect to any claim amendments or cancellations, Applicants have not dedicated to the public or abandoned any unclaimed subject matter and moreover have not acquiesced to any rejections and/or objections made by the Patent Office. Applicants expressly reserve the right to pursue prosecution of any presently excluded subject matter or claim embodiments in one or more future continuation and/or divisional application(s).

Rejections under 35 U.S.C. §103(a)

Claims 1-4, 8-12, 18, 19, and 22-25 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Lu et al. (2001) *J. of Ahenzhou Institute of Technology* 22/2:1-7 (“Lu”) as evidenced by Duan et al., U.S. Publication No. 2005/0031734 (“Duan”). Applicants respectfully traverse this rejection.

As an initial matter, Applicants note that Duan is the present application under

examination. An application that is being examined cannot be used as evidence in a prior art rejection against itself. Thus, the cited reference Duan is not available as prior art.

An obviousness rejection requires, *inter alia*, that cited references teach or suggest all elements of a claimed invention. Lu does not teach or suggest the claim element of contacting ungelatinized (insoluble) starch with maltogenic and starch liquefying enzymes or the claim element of conducting a method for producing isomalto-oligosaccharide from starch at a temperature less than or at the gelatinization temperature of the starch.

The Examiner states that “Lu *et al.* teach enzymatic preparation of isomalto-oligosaccharide using wheat starch as raw material, where the starch slurry is liquefied by thermostable α -amylase ‘SPEZYME Fred’, saccharified by fungal α -amylase ‘CLARASE L’ and transglucosylated by ‘Transglucosidase L-500.’” Office Action, page 3, emphasis added. Thus, the process disclosed by Lu concerns liquification of starch, followed by saccharification and transglucosylation of the liquefied starch. (See, *e.g.*, flow chart 1.2.1 on page 2 of Lu.) In contrast, the presently claimed methods comprise contacting ungelatinized, *i.e.*, non-liquified starch with maltogenic and starch liquefying enzymes at a temperature less than or at the gelatinization temperature of the starch. Lu does not teach these elements of the claims.

Lu also does not suggest a process for production of isomalto-oligosaccharide in which starch is not liquified as an initial step. The Examiner admits that “the reference does not specifically indicate the steps of contacting grain ungelatinized starch with a starch liquifying enzyme and a maltogenic enzyme to produce maltose (the first and second enzymes together), and contacting the maltose with a transglucosidase (the third enzyme) at the temperature less than or at a starch gelatinization temperature.” Office Action, page 3. However, the Examiner asserts that such a method would be obvious “because Lu *et al.* teach the same three enzymes are used to react with the same starting material (*i.e.*, grain ungelatinized starch) to produce the same intermediate (*i.e.*, maltose) and the final product (*i.e.*, isomalto-oligosaccharid [*sic.*]”).” Office Action page 4. Applicants disagree with this reasoning. The intermediate taught in Lu is liquified starch, not maltose. (See flow chart 1.2.1 on page 2, which describes “liquefying” a starch slurry, followed by enzyme inactivation prior to contact with saccharification enzymes.) In contrast, the intermediate in the presently claimed invention is maltose, and production of

maltose as an intermediate is optional (see claim 2, wherein production of maltose and isoaltono-oligosaccharide may occur concurrently).

An obviousness rejection also requires that cited references provide a reasonable expectation of success in practicing the claimed invention. As discussed above, Lu specifically teaches that starch must be liquified before contact with maltogenic and transglucosidase enzymes. A person of skill in the art would not predict success practicing a method for production of isomalto-oligosaccharide without first liquefying the starch, based on the teaching of Lu.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

Claims 1-6, 8-12, and 18-25 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Vercauteren et al., U.S. Patent No. 6,025,168 (“Vercauteren”), in view of Knight et al., U.S. Patent No. 3,630,774 (“Knight”) as evidenced by Duan. Applicants respectfully traverse this rejection.

As discussed above, Duan is the present application under examination and is not available as prior art.

An obviousness rejection requires, *inter alia*, that cited references teach or suggest all elements of a claimed invention. Vercauteren does not teach or suggest the claim element of contacting ungelatinized (insoluble) starch with maltogenic and starch liquefying enzymes or the claim element of conducting a method for producing isomalto-oligosaccharide from starch at a temperature less than or at the gelatinization temperature of the starch.

Vercauteren is directed to use of immobilized enzymes for conversion of starch hydrolysates to isomalto-oligosaccharide syrups. The Examiner states that “Vercauteren *et al.* teach a normal production method of isomalto-oligosaccharide . . . using a slurry of corn, potato or tapioca starch as raw material, where the starch slurry is liquified by a thermostable α -amylase to a 6 to 10 DE liquifact, . . . and β -amylase and transglucosylated [sic.] are added.” Office Action, page 4, emphasis added. Thus, Vercauteren teaches a process in which starch is liquified prior to addition of maltogenic and transglucosidase enzymes. In contrast, the presently

claimed invention recites contacting an ungelatinized, i.e., non-liquified starch with maltogenic and starch liquefying enzymes, in a process that proceeds at a temperataure less than or at the gelatinization temperature of the starch. Vercauteren does not teach or suggest such a process.

The Examiner admits that “Vercauteren *et al.* do not teach using a ungelatinated grain starch as raw material to prepare an isomalto-oligosaccharide composition.” Office Action, page 5. However, the Examiner asserts that “Knight *et al.* teach corn, wheat, potato, tapioca, rice, sago and sorghum all contain granular starch, and any type of ungelatinized starch may be used as a starting [sic.] material as long as it is granular in character” and that “it would have been obvious . . . to make an isomalto-oligosaccharide composition from an ungelatinized starch of grain as taught by Knight *et al.* using a thermostable α -amylase (the first enzyme) and a β -amylase (the second enzyme) to liquefying [sic.] the starch slurry and to produce maltose, and a transglucosidase (the third enzyme) to produce an isomalto-oligosaccharid [sic.] composition.” Office Action, page 5, emphasis added. Applicants disagree with this reasoning. The starch is not liquified in the currently claimed methods. Further, Knight teaches a mechanical process for making granular starch with certain properties, not using it as a starting material for production of isomalto-oligosaccharide. Thus, Knight does not cure the deficiencies of Vercauteren, i.e., a lack of teaching of an ungelatinized (non-liquified) starch starting material or a process that occurs at a temperature less than or at the gelatinization temperature of the starch. The cited combination of references does not teach or suggest all of the elements of the claims and does not render the instant invention obvious.

An obviousness rejection also requires that cited references provide a reasonable expectation of success in practicing the claimed invention. As discussed above, Vercauteren specifically teaches that starch must be liquified before contact with maltogenic and transglucosidase enzymes. A person of skill in the art would not predict success practicing a method for production of isomalto-oligosaccharide without first liquefying the starch, based on the teaching of Vercauteren. Knight merely teaches production of granular starch but does not teach or suggest that it could be successfully used in a method for production of isomalto-oligosaccharide without liquification. Thus, a person of skill in the art would not predict success in practicing the claimed invention from the cited combination of references.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 07-1048, referencing Docket No. GC791-3. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

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